AMENDMENT TO THE CLAIMS

1. (currently amended) An apparatus for measuring characteristics of a substance located within a coordinate system having an X-axis, a Y-axis and a Z-axis, comprising:

a light source to generate light;

a first lens to collimate the light from the light source in a direction toward the substance along the Z-axis;

a second lens receiving the collimated light transmitted through the first lens and adapted to focus the light into a focal region in the substance;

an actuator operably coupled to the second lens to oscillate the second lens along the Z-axis ~~an axis of a direction of the light~~;

a position sensor operably coupled to the second lens to sense a position of the second lens; and

a sensor receiving the light reflected from the focal region in the substance and providing~~e~~ a signal indicative thereof as a function of the position of the second lens.

2. (original) The apparatus of claim 1 and further comprising a signal processing module receiving the signal from the sensor and providing an output indicative of properties of the substance at said focal region.

3. (original) The apparatus of claim 2 and further comprising a display coupled to the signal processing module to display the output.

4. (original) The apparatus of claim 2 wherein the signal processing module is adapted to provide a feedback signal

indicative of an acceptable working distance from the apparatus to the substance.

5. (original) The apparatus of claim 2 wherein the output is indicative of a thickness of the substance.

6. (original) The apparatus of claim 2 wherein the output is indicative of an opacity of the substance.

7. (original) The apparatus of claim 1 and further comprising a filter to form an image pattern of light from the light source.

8. (original) The apparatus of claim 7 wherein the image pattern includes at least three focal spots, spaced apart from one another.

9. (original) The apparatus of claim 8 wherein the sensor receives reflected light indicative of the at least three focal spots and wherein a signal processing module is coupled to the sensor and calculates a relative phase difference of signals associated with each of the at least three spots and provides an output indicative thereof.

10. (original) The apparatus of claim 1 and further comprising a beam splitter to partially deflect light from the light source and reflect light from the focal region of the substance to the sensor.

11. (previously presented) The apparatus of claim 1 wherein the second lens is a plastic aspheric lens.

12. (original) The apparatus of claim 1 wherein the light source is a fiber optic coupler.

13. (original) The apparatus of claim 1 wherein the light source is a light emitting diode.

14. (original) The apparatus of claim 1 wherein the light source is a laser.

15. (previously presented) The apparatus of claim 1 wherein a numerical aperture of the second lens is in a range from approximately 0.47 to approximately 0.22.

16. (original) A kit comprising the apparatus of claim 1 and at least one calibration plate having a known parameter to provide a reference for calibrating the apparatus.

17. (original) The kit of claim 16 wherein the known parameter is a thickness of the plate.

18. (original) The kit of claim 16 wherein the known parameter is an opacity of the plate.

19. (previously presented) An apparatus, comprising:
a light source to generate light;
means for scanning a plastic objective lens;
means for monitoring a position of the objective lens;
means for focusing the light throughout a substance at a focal region; and
means for detecting light reflecting off of the substance that is confocal with the focal region to provide a signal indicative of characteristics of the substance as a function of the position of the objective lens.

20. (original) The apparatus of claim 19 and further comprising means for calculating a thickness of the substance.

21. (original) The apparatus of claim 19 and further comprising means for calculating an opacity of the substance.

22. (original) The apparatus of claim 19 wherein the means for focusing includes a first lens to collimate the light and a second lens adapted to actuate in a direction parallel to the light and focus the light into a focal region of the substance.

23. (original) The apparatus of claim 19 and further comprising means for filtering the light to form an image pattern.

24. (currently amended) A method of quantitatively measuring characteristics of a cornea located within a coordinate system having an X-axis, a Y-axis and a Z-axis, comprising:

generating light;

collimating the light with a first lens in a direction toward the cornea along the Z-axis;

focusing the light with a second lens into a focal region of the cornea;

actuating the second lens along the Z-axis ~~an axis of the direction of light~~ to focus the light into the cornea at a rate equal to or greater than 10 hertz;

sensing a portion of light reflected from the focal region of the cornea; and

providing a signal indicative of the portion of light reflected.

25. (original) The method of claim 24 and further comprising displaying the signal indicative of the portion of light reflected.

26. (original) The method of claim 24 wherein the signal is indicative of a thickness of the cornea.

27. (original) The method of claim 26 and further comprising comparing the signal to a reference signal indicative of a known thickness.

28. (original) The method of claim 24 wherein the signal is indicative of an opacity of the cornea.

29. (original) The method of claim 28 and further comprising comparing the signal to a reference signal indicative of a known opacity.

30. (original) The method of claim 24 and further comprising filtering the light to form an image pattern of light.

31. (original) The method of claim 30 wherein the image pattern includes at least three focal spots, spaced apart from one another.

32. (original) The method of claim 31 and further comprising receiving reflected light indicative of at least three focal spots and calculating a relative phase difference of signals associated with each of the at least three spots.

33. (original) The method of claim 24 and further comprising partially deflecting light and reflecting light from the focal region with a beam splitter.

34. (original) The method of claim 24 and further comprising partially deflecting light and reflecting light from the focal region with a fiber optic coupler.

35. (previously presented) The method of claim 24 wherein the second lens is a plastic lens.

36. (previously presented) The method of claim 35 wherein the second lens has a numerical aperture in a range from approximately 0.47 to approximately 0.22.

37. (original) The method of claim 24 and further comprising providing a feedback signal indicative of an acceptable working distance between the second lens and the cornea.